

**PERFORMANCE WORK STATEMENT**  
**TSAWP MULTIPLE AWARD CONTRACT TASK ORDER**  
**CONTRACT EP-C-17-046**  
April 2019

**A. TITLE: Technical Support for West Virginia Ionic Toxicity TMDLs**

**B. OBJECTIVES AND BACKGROUND**

**Objectives**

The purpose of this Performance Work Statement (PWS) is to support Total Maximum Daily Loads (TMDL) development by the West Virginia Department of Environmental Protection (WVDEP) for West Virginia waterbodies where ionic toxicity has been identified as a contributing cause of biological impairment. Specifically, an appropriate and scientifically defensible TMDL endpoint, or multiple endpoint options, will be developed from data and technical analysis. Stakeholder engagement and model development to support the ionic toxicity TMDL development are also needed. A pilot ionic toxicity TMDL model will be developed for the Lower Guyandotte River Watershed.

**Background on West Virginia Ionic Toxicity TMDLs**

To establish a TMDL for waterbodies identified as biologically impaired on West Virginia's Section 303(d) list, WVDEP identifies the cause of the biological impairment, *i.e.*, the type of pollutant that will be allocated in the TMDL(s) to address the biological impairment, through a stressor identification procedure completed during the TMDL development phase. In the course of working on previous TMDLs, WVDEP identified certain waters as biologically impaired due to ionic toxicity. Ionic toxicity results from the presence of excessive amounts of dissolved solids (e.g., mineral salts) in a waterbody and can cause biologic impairment by adversely impacting aquatic life. While WVDEP has historically had sufficient information regarding instream ionic toxicity levels and their effects on benthic macroinvertebrates to identify ionic toxicity as a cause of biological impairment in these waters, WVDEP lacked sufficient information about which particular dissolved solid(s) (e.g. sulfate, bicarbonate, magnesium, chloride, potassium, etc.) caused the ionic stress, and their associated impairment thresholds and their sources, to establish a defensible TMDL.

In the fall of 2010, EPA and WVDEP began a project to develop a pilot TMDL for ionic toxicity in streams in the Upper Kanawha Watershed. EPA and WVDEP collaborated on workgroups focused on TMDL planning, endpoint development, model development, and treatment technology. During the pilot project, a TMDL endpoint was proposed for specific conductivity and a model was developed. WVDEP ended participation in the pilot project in April 2012, citing state legislation that required the development of new assessment methodology to determine biological impairment. Since that time, WVDEP has developed hundreds of pollutant TMDLs that address biological impairment caused by stressors other than ionic toxicity.

EPA and WVDEP have acknowledged the need to show progress in developing ionic toxicity TMDLs. EPA and WVDEP need contractor support for determining ionic toxicity TMDL endpoint(s), stakeholder engagement and model development. EPA and WVDEP are interested in developing ionic toxicity modeling tools in a pilot watershed where TMDL development is currently occurring. As part of its Watershed Management Framework approach to TMDL development, WVDEP is developing TMDLs in the Lower Guyandotte River Watershed for other pollutants (fecal coliform bacteria, total iron and selenium) with anticipated completion by December 2020. Potential waters from the Lower Guyandotte River Watershed to be included in pilot model development are included in Attachment 1.

## C. TASKS

The contractor shall provide support for the below tasks. Written technical direction shall be utilized to provide further detail on specific work included in the PWS, provide guidance, or approve or comment on deliverables. The Task Order Contracting Officer Representative (TOCOR), the Alternate TOCOR (if the TOCOR is on leave or travel), and the Contracting Officer are the only individuals authorized to issue technical direction. The contractor shall anticipate working with the TOCOR, staff leads from EPA Water Protection Division (WPD) and WVDEP to furnish the requested technical assistance. **However, only the TOCOR may issue written technical direction.**

### **Task 1: Kickoff Meeting, Reporting, and Communication**

The contractor shall participate in a Kickoff Meeting with the TOCOR either in person or via conference call to discuss the following: points of contact, roles and responsibilities, timelines, the schedule of benchmarks, milestones and deliverables, establish dates and times for monthly calls, monthly technical progress reports, and general Task Order administrative information. The technical progress reports shall include status updates of all of the tasks of this PWS.

The TOCOR will coordinate and set-up monthly working calls between EPA staff and the contractor's technical lead to discuss the status and progress of the work under this Task Order. The contractor shall participate in these monthly calls. The frequency of the monthly conference calls may be modified based on project status at the request of the contractor and only as approved by EPA.

The contractor shall notify the TOCOR of any problems, delays or questions as soon as they arise, including immediate written notification of any Task Order delays. The contractor shall provide a written monthly status report in accordance with contract requirements which shall be used for invoice review purposes. All reporting shall be provided in accordance with the PWS Sections E and F.

In general, written materials including meeting summaries shall be furnished by the contractor within five business days after request in draft form for the TOCOR to review; then a final written deliverable would be expected within five business days after receipt of written technical direction from the TOCOR, including the TOCOR's comments and edits to the draft deliverable.

Task 1 Deliverables: Meeting summaries following conference calls

## **Task 2: West Virginia Ionic Toxicity TMDL Support**

### **Task 2.1: Facilitation Support for WV Ionic Toxicity TMDL Endpoint Technical Advisory Committee**

The contractor will organize six to nine monthly conference calls and/or webinars of the WV Ionic Toxicity TMDL Endpoint Technical Advisory Committee (TAC) and attend at least one in-person meeting to discuss TMDL endpoints and approach for model development. The contractor will work closely with the TAC and prepare agendas and meeting minutes. The frequency of the monthly conference calls may be modified based on the project status at the request of the contractor and only as approved by EPA. Any in-person meeting will be held at the WVDEP Headquarters in Charleston, WV.

Task 2.1 Deliverables: Agendas, meeting minutes, and correspondence from committee

### **Task 2.2: Technical Support for Ionic Toxicity TMDL Endpoint Development**

Under a previous Task Order, options for proposed ionic toxicity TMDL endpoints were prepared through data and technical analysis<sup>1</sup>. The proposed TMDL endpoints and rationale will serve as a starting point. The contractor shall utilize water quality and biological data provided by EPA and WVDEP to perform additional technical and statistical analyses to develop an appropriate, scientifically defensible, and specific numeric TMDL endpoint, or multiple numeric endpoint options, to address biological impairments caused by ionic toxicity. To properly characterize ionic strength, general measures of electrical conductivity, such as specific conductivity and total dissolved solids (TDS), as well as individual ions (e.g. sulfate, bicarbonate, magnesium, chloride, potassium, etc.) should be analyzed to identify which one ion or combination of ions contribute(s) significantly to biological impairment. The contractor will participate in monthly conference calls of the WV Ionic Toxicity TMDL Endpoint TAC. When requested by the TOCOR, the contractor will prepare TAC meeting presentations and/or materials on technical aspects of the TMDL endpoint analyses and model development approach and be prepared to answer questions. The contractor shall prepare a draft and a final version of the Ionic Toxicity TMDL Endpoint document providing a detailed overview of the data and technical analyses used to identify water quality endpoints for ionic toxicity.

Task 2.2 Deliverables: Ionic Toxicity TMDL Endpoint document and technical presentations and/or materials for the Ionic Toxicity TMDL Endpoint TAC monthly calls.

### **Task 2.3: Ionic Toxicity TMDL Model Selection**

The contractor will work with EPA and WVDEP to determine an appropriate model to address waters impaired by ionic toxicity. EPA will share previous work products, including a TMDL

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<sup>1</sup> Previous Task Order ionic toxicity endpoint deliverables can be made available during the bidding process, as requested.

modeling development using WVDEP's Mining Data Analysis System (MDAS)<sup>2</sup> as a starting place for these deliberations. Recommendations should consider the availability of data and existing model set up for previous or current TMDL project areas. The contractor may make new approach recommendations based on their modeling expertise. Using literature reviews or other technical analyses, the contractor will characterize potential general sources of ionic toxicity including mining, wastewater treatment plants, straight pipes, etc. to incorporate into the modeling framework. The characterization of hydrologic alterations due to mining and potential similarities to glacial till hydrology should be explored. The contractor will provide model recommendations based on the complexity of the pollutant loading dynamics, sources, data availability, etc. Ionic toxicity model recommendations should be compatible with WVDEP's current modeling platform so that future ionic toxicity modeling can make use of hydrology calibrations already completed for previous TMDL project areas. The contractor will prepare a memo summarizing the model selection, which will include model programs, watershed boundaries, modeling timeframe, as well as other elements the contractor deems appropriate.

#### Task 2.3 Deliverables: Model Selection Memo

#### **Task 2.4: Ionic Toxicity TMDL Modeling QAPP Development**

The contractor shall prepare a modeling QAPP taking into consideration *Guidance on QA Project Plans for Modeling* (EPA QA/G – 5M)<sup>3</sup>. The contractor will work with EPA and WVDEP to determine which elements of the QAPP should be included.

#### Task 2.4 Deliverables – Ionic Toxicity Modeling QAPP

#### **Task 2.5: Ionic Toxicity TMDL Model Development in Pilot Watershed**

Upon approval of the modeling QAPP, the contractor shall develop the pilot model for the Lower Guyandotte River Watershed in accordance with the QAPP. Potential waters to be included in pilot model development are included in Attachment 1. WVDEP is currently working in the Lower Guyandotte River Watershed to develop TMDLs for other pollutants (fecal coliform bacteria, total iron, and selenium) and will have completed pre-TMDL monitoring, pollutant source tracking, model land use, basic hydrology calibration and continuous discharge representation by October 2020. The contractor shall incorporate this recent data and model information supplied by WVDEP into the pilot ionic toxicity model for the Lower Guyandotte River Watershed. The contractor shall develop a calibrated and validated model, TMDL allocation scenarios, and a modeling report. Water quality calibration is contingent upon final ionic toxicity TMDL endpoint(s) to be determined in Task 2.2 above. The modeling report shall be broken up into milestones in order to allow for review and comment on the model development. The first milestone will include model background, such as model set-up and

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<sup>2</sup> MDAS was developed specifically for TMDL application in West Virginia to facilitate large scale, data intensive watershed modeling applications. MDAS is based upon Hydrologic Simulation Program–FORTRAN (HSPF) but has no inherent limitations in terms of modeling size or upper limit of model operations. The dynamic watershed model component within MDAS is the Loading Simulation Program–C++ (LSPC) (Shen, et al., 2002). The model simulates nonpoint source flow and pollutant loading as well as instream flow and pollutant transport and is capable of representing time-variable point source contributions.

<sup>3</sup> [ HYPERLINK "<https://www.epa.gov/quality/guidance-quality-assurance-project-plans-modeling-epa-qag-5m>" ]

watershed characteristics. The second milestone will characterize the calibrated and validated model, including graphical representations of model output. The third milestone will present a minimum of two TMDL allocation scenarios. This milestone will include graphical representations of endpoint/water quality standard attainment. The fourth milestone will include discussion on TMDL requirements, including critical conditions, seasonal variability, margin of safety, and conservative assumptions. Additionally, the contractor will share model input and output files upon completion of the modeling report. Model files should include model input, model output, for existing conditions and TMDL scenarios along with an index (or another appropriate document) that identifies each file included. All relevant GIS files should also be delivered at this time. The contractor will also provide training to WVDEP and EPA on how to use the modeling tools.

#### Task 2.5 Deliverables:

##### Deliverable 2.5.1: Ionic Toxicity Modeling Report

###### Deliverable 2.5.1.1: Model Background

###### Deliverable 2.5.1.2: Calibrated and Validated Model

###### Deliverable 2.5.1.3: TMDL Allocation Scenarios

###### Deliverable 2.5.1.4: TMDL Requirements

##### Deliverable 2.5.2: Model and GIS Files

### **D. SCHEDULE OF BENCHMARKS AND DELIVERABLES**

As a general rule, upon receipt of a draft deliverable, EPA will have three weeks to collate internal and external comments and return to the contractor. The contractor will then have an additional one week to make changes, which will be reviewed by EPA. EPA will have one week to indicate any necessary final adjustments. If final adjustments are needed, the contractor will have three additional business days to finalize the document.

The deliverables and anticipated completion dates are as follows:

Task	Deliverables	Task Completion Timeframe	Task Finalization
Task 1 – Initiate project kickoff conference call	Deliverable 1: Meeting summary	Within 7 days of contract award	1 week after draft submittal
Task 2.1 – Facilitation Support for WV Ionic Toxicity TMDL Endpoint TAC	Deliverable 2.1: Agendas, meeting minutes and correspondence	Entire task within 11 months of completion of Task 1. Monthly calls for 6-9 months to start within 2 months of completion of Task 1. Agendas due 1 week ahead of meeting. Meeting minutes due 1 week after meeting.	Within 1 week after draft submittal of agendas and meeting minutes
Task 2.2 – Technical Support for Ionic Toxicity TMDL	Deliverable 2.2: Ionic Toxicity TMDL Endpoint document and	Within 12 months of completion of Task 1. Technical presentations should	Within 6 weeks after draft submittal

Task	Deliverables	Task Completion Timeframe	Task Finalization
Endpoint Development	technical presentations for TAC	be submitted one week ahead of meetings.	
Task 2.3 – Ionic Toxicity Model Selection	Deliverable 2.3: Ionic Toxicity Model Selection Memo	Within 2 months of completion of Task 1	Within 6 weeks after draft submittal
Task 2.4 – Ionic Toxicity Modeling QAPP Development	Deliverable 2.4: Ionic Toxicity Modeling QAPP	Draft QAPP for EPA QA team review within 3 months of completion of Task 2.3. Final approved QAPP within 6 months of Draft QAPP submittal.	Upon review and approval by EPA QA team
Task 2.5 – Ionic Toxicity Model Development	Deliverable 2.5.1: Ionic Toxicity Modeling Report	Broken up into milestones, see below for timeframe	Upon Completion of deliverable 2.5.1.4
	Deliverable 2.5.1.1: Ionic Toxicity Model Background	Research for Model Background within 6 months of Task 2.4 Draft QAPP. Model Background writeup within 1 month of completion of Task 2.4 (Final Approved QAPP).	Within 6 weeks after draft submittal
	Deliverable 2.5.1.2: Calibrated and Validated Ionic Toxicity Model	Within 4 months of completion of Task 2.4 (Final Approved QAPP) and Task 2.2 (Final Endpoint Document).	Within 6 weeks after draft submittal
	Deliverable 2.5.1.3: Ionic Toxicity TMDL Allocation Scenarios	Within 2 months of finalizing Deliverable 2.5.1.2	Within 6 weeks after draft submittal
	Deliverable 2.5.1.4: Ionic Toxicity TMDL Requirements	Within 1 month of finalizing Deliverable 2.5.1.3	Within 6 weeks after draft submittal
	Deliverable 2.5.2: Ionic Toxicity Model and GIS Files	Within 1 month of completion of deliverable 2.5.1	Within 2 weeks after draft submittal

## E. REPORTING

All documentation and reporting under this Task Order shall be in compliance with contract requirements.

## F. DELIVERABLES AND GENERAL PERFORMANCE

The contractor shall participate in meetings and conference calls arranged by the EPA TOCOR. The contractor shall, when requested by the TOCOR, provide supporting documentation when

EPA is reviewing draft deliverables to facilitate EPA review and approval of the contractor's work. Documentation shall include the electronic files and detailed, written explanation of all steps and decisions. The contractor is expected to comply with this request when it is received from the TOCOR regardless of whether such a request is described in the individual tasks of this PWS. The contractor is expected to furnish this information in such a manner that no proprietary software will be needed for EPA to read, interpret, replicate or model any work product of this agreement, unless otherwise noted in this PWS or by written permission of the EPA TOCOR. The objective is that anyone with the appropriate skill level can use the information produced under this Task Order to check or duplicate the contractor's work for replication and/or verification. With this understanding of how this Task Order's data will be used, any elements essential to successfully replicating analysis shall be provided to EPA in a commonly-used format.

The contractor shall provide to the TOCOR written evidence of the contractor's scientific/technical and editorial review on any Task Order **draft** product before submission to the EPA TOCOR for review. This process does not need to be performed by an independent peer reviewer. It is expected that all editorial review comments shall be addressed before deliverables are furnished to the EPA TOCOR for review (in the case of draft deliverables) or acceptance (in the case of final deliverables); and that questions raised by scientific/ technical review will be either addressed or discussed with the EPA TOCOR prior to the contractor furnishing draft deliverables.

All deliverables (draft and final) to EPA shall be furnished in an electronic format that EPA can support (see TSAWP Contract PWS Section 4.0 Deliverables). All final deliverables shall be prepared according to EPA publication guidelines and shall be compliant with Section 508 of the Americans with Disabilities Act.

All draft and final deliverables from the contractor under this PWS are potentially subject to Freedom of Information Act requests.

**All submittals** to EPA shall be formatted as described below:

- Any written reports, summaries or analysis documents shall be in electronic Microsoft Word®.
- Any and all spreadsheets, raw data, coding and modeling work (including all model runs with essential data to replicate model runs) shall be in electronic Microsoft Excel® or XML formats.

Appropriate electronic format that is supported by EPA and printing of all GIS data layers, maps, photos, bench sheets and other written material not easily printed or saved in the above formats will be discussed and a format agreed upon with the EPA TOCOR prior to submittal by the contractor.

## **G. ANTICIPATED TRAVEL**

All travel under this Task Order shall be in compliance with contract requirements and only according to specific written Technical Direction from the TOCOR. (See contract clause H-17).

The vast majority of interactions will be conducted through conference calls. When in-person meetings are required, the length of the meetings and the amount of contract personnel needed for each trip will be provided to the contractor through written technical direction from the TOCOR.

## **H. CONTRACTOR IDENTIFICATION**

Contractor personnel shall always identify themselves as Contractor employees by name and organization and physically display that information through an identification badge. Contractor personnel are prohibited from acting as the Agency's official representative.

The Contractor shall refer any questions relating to the interpretation of EPA policy, guidance, or regulation to the EPA TOCOR.

## **I. MEETING GUIDELINES AND LIMITATIONS:**

Travel is not anticipated to be routine under this contract. EPA expects that the majority of the dollars to go toward the development of the technical documents. EPA projects that none of the individual meetings identified in these tasks will exceed a total cost of \$1,000 with total travel not to exceed \$5,000. The contractor shall immediately notify the EPA Contracting Officer, PO and TOCOR of any anticipated individual event which meets the definition of a "conference," with total net expenditures anticipated to be greater than \$20,000.

A **"conference" or "conference-related activity"** is an internal or external meeting, retreat, seminar, symposium or event that involves expenses from the following categories: attendee travel paid for by the EPA; training activities; or EPA hosted or co-hosted, sponsored or co-sponsored events incurring speaker fees, food and refreshment expenses, non-federal facility expenses, audio visual expenses and/or contract related conference expenses. **"Conference expenses"** are all direct and indirect conference costs paid by the government, whether paid directly by agencies or reimbursed by agencies to travelers or others associated with the conference, but do not include funds paid under federal grants to grantees. Conference expenses include any associated authorized travel and per diem expenses, hire of rooms for official business, audiovisual use, light refreshments, registration fees, ground transportation, and other expenses as defined by the Federal Travel Regulation. All outlays for conference preparation and planning should be included. The FTR provides some examples of direct and indirect conference costs included within conference expenses. After notifying EPA of the potential to reach this threshold, the contractor shall not proceed with the task(s) until authorized to do so by the Contracting Officer.

**J. QUALITY ASSURANCE SURVEILLANCE PLAN:** Per contract requirements as supplemented herein:

EPA anticipates that the contractor's work will be judged "satisfactory" according to the QASP if the TOCOR's edits to deliverables are no more than ten percent (10%) of the content of any draft deliverable, or less than two percent (2%) of any final deliverable. In addition, EPA anticipates that the Contractor's work will be judged "satisfactory" according to the QASP if less



than ten percent (10%) of the pages of written final deliverables contain the TOCOR's edits for such things as grammar, punctuation and format. The EPA TOCOR can upon request furnish a copy of the EPA correspondence manual for the contractor's use.

## **K. VALIDATION OF SECTION 508 COMPLIANCE OF TASK ORDER DELIVERABLES**

The Contractor shall support the TOCOR in conducting a "Final Deliverable Validation" to ensure compliance with Section 508 and the Federal Acquisition Regulations (FAR) related to "electronic and information technology (EIT) deliverables". The Contractor shall furnish certification, in writing, to the TOCOR that the Contractor has complied with EPAAR Clause 1552.211-79 "Compliance with EPA Policies for Information Resources Management", including the requirement that all electronic and information technology (EIT) deliverables be Section 508 compliant in accordance with the policies referenced at [ HYPERLINK "http://www.epa.gov/accessibility/" ] .

## **L. REFERENCES**

### **Links to background documents relevant to this PWS:**

U.S. EPA. 2011. A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams. Office of Research and Development, National Center for Environmental Assessment, Washington, DC. EPA/600/R-10/023F.

[ HYPERLINK "https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=233809" ]

U.S. EPA. 2011. The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields (2011 Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/138F, 2011.

[ HYPERLINK "https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=225743" ]

U.S. EPA. 2016. Draft Field-Based Methods for Developing Aquatic Life Criteria for Specific Conductivity. Office of Water, Washington, DC. EPA-822-R-07-010.

[ HYPERLINK "https://www.epa.gov/wqc/draft-field-based-methods-developing-aquatic-life-criteria-specific-conductivity" ]

## **M. GOVERNMENT FURNISHED INFORMATION**

The following information can be provided to the contractors by request:

- Contract Task Order Deliverables for 2010 West Virginia Ionic Toxicity Pilot TMDL and Endpoint Development

Attachment 1  
West Virginia Waters in the Lower Guyandotte River Watershed for which WVDEP will Submit  
TMDLs to Address Biological Impairment

<b>TMDL Watershed</b>	<b>Stream Name</b>	<b>WV Code</b>
Lower Guyandotte	Guyandotte River (Lower)	WVOG-Io
Lower Guyandotte	Parsner Creek	WVOGM-38
Lower Guyandotte	Mill Creek	WVOG-59
Lower Guyandotte	Tanyard Branch	WVOGM-1.5
Lower Guyandotte	Little Cabell Creek	WVOGM-3
Lower Guyandotte	Big Cabell Creek	WVOGM-4
Lower Guyandotte	Fudges Creek	WVOGM-6
Lower Guyandotte	Wire Branch	WVOGM-6-0.5A
Lower Guyandotte	Mill Creek	WVOGM-8
Lower Guyandotte	Right Fork/Mill Creek	WVOGM-8-C
Lower Guyandotte	Johns Branch	WVOGM-11
Lower Guyandotte	Indian Fork	WVOGM-12
Lower Guyandotte	Charley Creek	WVOGM-14
Lower Guyandotte	Trace Creek	WVOGM-19
Lower Guyandotte	Trace Fork	WVOG-49-D
Lower Guyandotte	Coon Creek	WVOGM-20-A
Lower Guyandotte	Straight Fork	WVOGM-22-A
Lower Guyandotte	Meadow Branch	WVOGM-25-A
Lower Guyandotte	Straight Fork	WVOGM-25-H
Lower Guyandotte	Valley Fork	WVOGM-25-H-1
Lower Guyandotte	Sugartree Fork	WVOGM-25-I
Lower Guyandotte	Big Creek	WVOGM-35
Lower Guyandotte	Left Fork/Mud River	WVOGM-39
Lower Guyandotte	Stinson Branch	WVOGM-39-E
Lower Guyandotte	Upton Branch	WVOGM-40.3
Lower Guyandotte	Ballard Fork	WVOGM-49
Lower Guyandotte	Davis Creek	WVOG-3
Lower Guyandotte	Edens Branch	WVOG-3-0.5A
Lower Guyandotte	Smith Creek	WVOG-11
Lower Guyandotte	Cavill Creek	WVOG-12
Lower Guyandotte	Madison Creek	WVOG-17
Lower Guyandotte	Twomile Creek	WVOG-24
Lower Guyandotte	Fourmile Creek	WVOG-27
Lower Guyandotte	Ninemile Creek	WVOG-31
Lower Guyandotte	Tenmile Creek	WVOG-32
Lower Guyandotte	Lick Branch	WVOG-34-A
Lower Guyandotte	Aarons Creek	WVOG-35
Lower Guyandotte	Laurel Creek	WVOG-38-D

<b>TMDL Watershed</b>	<b>Stream Name</b>	<b>WV Code</b>
Lower Guyandotte	Dry Run	WVOG-41
Lower Guyandotte	Short Bend Fork	WVOG-42-A
Lower Guyandotte	Laurel Fork	WVOG-42-C
Lower Guyandotte	West Fork/Big Harts Creek	WVOG-44-A
Lower Guyandotte	Smokehouse Fork	WVOG-44-E
Lower Guyandotte	Buck Fork	WVOG-44-G
Lower Guyandotte	Vickers Branch	WVOG-49-C
Lower Guyandotte	UNT/Big Creek RM 3.28	WVOG-49-C.1
Lower Guyandotte	Trace Fork	WVOGM-20
Lower Guyandotte	Hurricane Branch	WVOG-49-D-1
Lower Guyandotte	Garrett Fork	WVOG-49-E
Lower Guyandotte	Perrys Branch	WVOG-49-E-1
Lower Guyandotte	South Fork/Crawley Creek	WVOG-51-G.5
Lower Guyandotte	Fowler Branch	WVOG-51.5